WHAT IS CLAIMED IS:

1. A method for forming a metal oxide coating on a metal cutting tool, comprising :

(a) applying a liquid metal carboxylate composition, or a solution thereof, to a metal cutting tool, wherein the liquid metal carboxylate composition comprises a solution of a metal salt of a carboxylic acid in a solvent , and

(b) exposing the metal cutting tool with the applied liquid carboxylate to an environment that will convert at least some of the metal carboxylates to metal oxides.

2. The method of claim 1, wherein the solvent comprises a carboxylic acid, and further comprising exposing the cutting tool to an environment that will cause vaporization or dissipation of any carboxylic acid solvent.

3. The method of claim 2, wherein the solvent comprises at least one carboxylic acid that corresponds to a carboxylate moiety in the liquid metal carboxylate composition.

4. The method of claim 1, wherein the carboxylic acid is a carboxylic acid having having the formula

R-C(R'')(R')-COOH

R is selected from H and C_1 to C_{24} alkyl groups, and

R' and R" are each independently selected from H or C_1 to C_{24} alkyl groups.

5. The method of claim 4, wherein the carboxylic acid is alpha-branched, wherein at least two of R, R' and R" are not H.

6. The method of claim 5, wherein R is H, R" is C_2H_5 and R' is C_4H_9.

7. The method of claim 1, wherein the carboxylic acid is a mixture of carboxylic acids.

8. The method of claim 7, wherein the average molecular weight of the acids contained in this mixture is from about 130 to 420.

9. The method of claim 7, wherein the average molecular weight of the acids contained in this mixture is from about 220 to 270.

10. The method of claim 9, wherein the mixture of carboxylic acids contains 2-ethylhexanoic acid as its lowest boiling acid constituent.

11. The method of claim 1, wherein the liquid metal carboxylate composition comprises a mixture of metals.

12. The method of claim 1, wherein the liquid metal carboxylate composition comprises one or more metals selected from the group consisting of Lithium, Beryllium, Sodium, Magnesium, Potassium, Calcium, Scandium, Titanium, Chromium, Manganese, Iron, Nickel, Cobalt, Copper, Zinc, Gallium, Rubidium, Strontium, Yttrium, Zirconium, Silver, Cadmium, Tin, Cesium, Cerium, Barium, Lanthanum, Hafnium, Tantalum, Gold, Thallium, Lead, Bismuth, Cerium, Praseodymium, Neodymium, Samarium, Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Thorium and Uranium.

13. The method of claim 11, wherein the metal is a mixture comprising:

up to 10% by weight of yttrium;

up to 5% by weight of chromium; and

the balance zirconium;

wherein the minimum total amount of yttrium is at least 3% and the minimum total of chromium is at least 2%.

14. The method of claim 11, wherein the metal is a mixture comprising:

7 to 8% by weight of yttrium;

2 to 3% by weight of chromium; and

89 to 91% by weight of zirconium;

excess carboxylic acids in the liquid metal carboxylate composition and

conversion of the metal carboxylates to metal oxides is carried out by heating the coated cutting tool.

16. The method of claim 15, wherein the cutting tool is heated to a temperature greater than about 400°C.

17. The method of claim 15, wherein the cutting tool is heated for about 3 to 5 minutes.

18. The method of claim 1, wherein the amount of metal in the liquid metal carboxylate composition is preferably in the range of 30 to 50 grams of metal per kilogram of liquid metal carboxylate composition.

19. The method of claim 18, wherein the amount of metal in the liquid metal carboxylate composition is 30 to 40 grams of metal per kilogram of liquid metal carboxylate composition.

20. A coated cutting tool comprising:

(a) a metal or hard-alloy cutting tool, and

(b) a coating comprising an oxidation product of metal carboxylate disposed on the cutting tool.

from hard-alloy

22. The coated cutting tool of claim 20, wherein the cutting tool is made from steel.

23. The coated cutting tool of claim 20, wherein the coating comprises an oxidized product of 2-ethylhexanoate.